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Phytogeographical studies on the genus *Hedysarum* L. with special reference to India**

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インドにおけるイワオウギ属植物の分布

Hedysarum L. is well known in the history of gradual generic refinement which was originally defined in 1753 as a genus to include all the lomented pod-legumes. However, the previous over-reliance on obvious pod characters has been gradually replaced by closer consideration of the flowers, inflorescences, seeds, seedlings and defence mechanism, resulting in a more natural generic classification and phytogeographic assessment. The present day *Hedysarum* comprises about 100 species, mostly perennial herbs or shrubs. It is distributed in the north temperate zone of European, Asiatic and American region and develop certain special morphological characteristics corresponding to their local, ecological conditions. However, all are basically interrelated by two wide ranging preglacial Siberian and Asiatic species groups, i. e., *H. hedysaroides* (L.) Schinz et Thell. and *H. alpinum* L., respectively having maximum number of geographic varieties or subspecific members. Independent origin of distinct species is also not uncommon in New and Old World with a number of endemic species also.

Europe has a direct land connection with Northern Asia through Kazakhastan in the southern part of Russia (Chrtková-Žertová 1968). The occurrence of *H. cretaceum* Fischer ex DC. and *H. bieberstenii* Žertová in south-east Russia across Kazakhastan to north-central Asia thus points to the migration of European *Hedysarum* L. to the Asiatic region through the above land connection.

It is believed that the mighty mountain system, Himalaya was formed about sixty million years ago as a result of a collison between a broken and drifted part of the great southern continent (Gondwanaland) and the Asian land mass. There is a Himalayan branch connecting Asia in the west across

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Afghanistan and a more southern branch entering Sind (cf. Rau 1975). Singh & Kachroo (1976) stated that the Pir Panjal range together with the Himalaya was once under the Mediterranean ocean, the tethys, separating India (which lay south of Equator) from the Eurasian land mass in the north. Into this sea, the Kashmir and the Assam promontaries are jetting out on the north-west and on the north-east of India, respectively.

Although there is no abrupt change between the Western and Eastern Himalayas, it is evident that comparatively dry condition prevails towards the western ranges, particularly in the interior which favour the influx of elements from Western and Central Asian mountains. Moreover, in the transition zone between the above two botanical provinces which correspond to the West and Central Nepal lying between 80° and 84°EL, the climatic factors presumably limit the capacity of the plants suited to one area.

The Western Himalaya present many glaciers and glacial morainic beds which are still in retreat. Recent studies (cf. Rau 1975, Singh & Kachroo 1976) have emphasized that the morainic deposit left in the dry northern valleys of Kumaon-Himalaya by the retreating glaciers, in course of time get a cover of vegetation and form an important habitat for high altitude plants. Kashmir had undergone four distinct glaciations, separated by interglacial warm periods. These glaciers in contrast to those in Sikkim, descend to as low as 2,500 m while recent terminal moraines are often observed at so low level as at 2,200 m.

In Indian context, the earlier unnatural but traditional *Hedysarum* L. was cosmopolitan in distribution, occurring in both temperate and tropical climates. But after critical taxonomic and phytogeographical investigation the authors have found that the genus is actually represnted in India by the recently discovered temperate members like, *H. kumaonense* Benth. ex Bak., *H. sikkimense* Benth. ex Bak., *H. cachemirianum* Benth. ex Bak., *H. falconeri* Bak., *H. astragaloides* Benth. ex Bak., *H. laxiflorum* Benth. ex Bak. and *H. microcalyx* Bak. and is confined to the Himalaya from Kashmir to Sikkim (Fig. 1). It is also apparent from the studies of the general distribution pattern of the above species that most of them appear to have migrated from Tibet, West China and adjoining North Asia (Afghanistan), etc. having probable recent origin from ancestors like *H. alpinum* L. and *H. hedysaroides* (L.) Schinz et Thell.-complex with limited distribution.

India has close contacts with mediterranean North Africa, and through

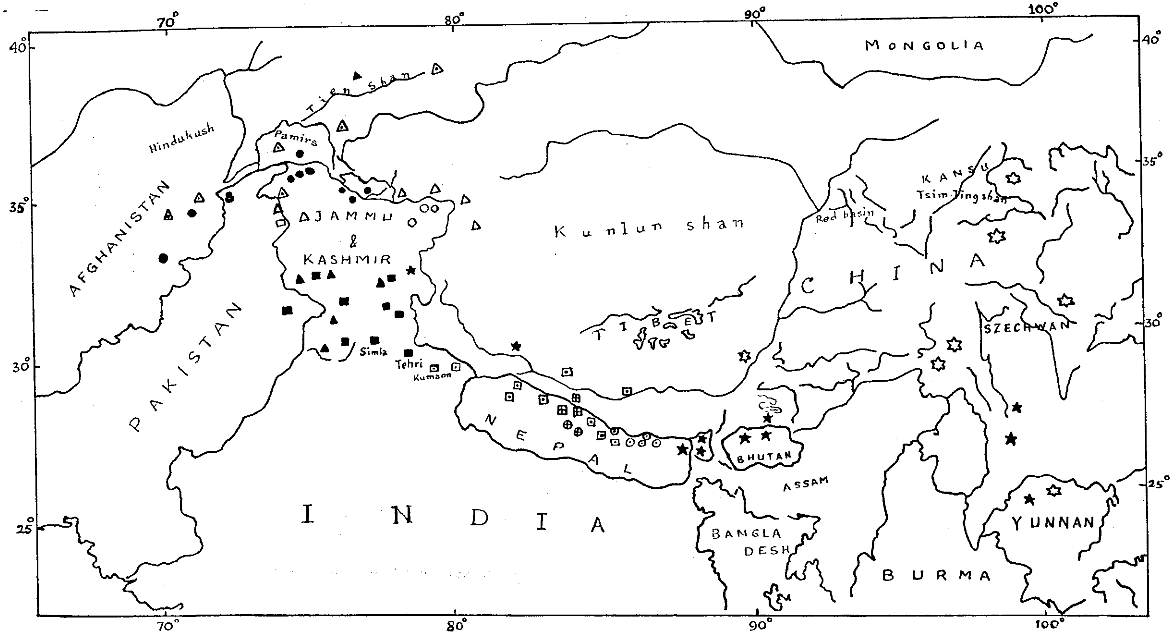

Fig. 1. Approximate distribution of the Himalayan species of *Hedysarum*.

● : *Hedysarum Falconeri*.
□ : *H. pseudomicrocalyx*.
△ : *H. alpinum* subsp. *laxiflorum*.
○ : *H. cachemirianum*.
■ : *H. microcalyx*.
▲ : *H. astragaloides*.
◬ : *H. minjanense*.
⊡ : *H. Kumaonense*.
★ : *H. Sikkimense*.
⊕ : *H. manaslense*.
⊙ : *H. campylocarpon*.
⊞ : *H. manaslense* var. *nepalense*.
☆ : *H. sikkimense* var. *megalanthum*.

them with West European countries for thousands of years in connection with various historical events and trade transactions. It has connections through invasions and suzerainty with China, Tibet, Mongolia, Afghanistan, Iran, etc. for thousand of years (Tiwari 1979), all of them thus acting as a potent factor in the to and fro migration of *Hedysarum* L. along with other plants. The existence of *H. alpinum* L. can be easily traced in the Indian region through *H. laxiflorum* Benth. ex Bak. which differs from the former only in having lax-inflorescence and wingless pod and presently considered as a sub-species. The parent species extends from Mongolia through comparatively suitable, drier, extreme western Himalayan range with gradual morphological changes, reaching only Kashmir as '*laxiflorum*' from where it extends towards Pakistan in the West and West-Tibet in the North. The occurrence of its two other closely related taxa namely *H. microcalyx* Bak. and *H. pseudomicrocalyx* Ohashi et Tateishi seems to be of recent origin with limited distribution. The latter is believed to be endemic in Hazara of Western Himalaya (Ohashi & Tateishi 1975) while the former has extended from rocky places of Tehri-Garhwal towards Upper Punjab at Lahul and Baspa valley of Simla Hills, ascending up to 4750 m and also in Pakistan. Closer morphological resemblences of *H. falconeri* Bak., *H. cachemirianum* Benth. ex Bak. and *H. astragaloides* Benth. ex Bak. with that of *H. hedysaroides* (L.) Schinz et Thell. point towards their common origin. Among these, *H. falconeri* Bak., considered sometimes as a variety of *H. obscurum* L. (a synonym of *H. hedysaroides* (L.) Schinz et Thell.) (Fedtschenko 1902) and on its synonymization with an afghan variety '*affghanicum* Fedtsch.' (Ohashi & Tateishi 1975, Ali 1977), its route of migration towards north-east direction via Pamir and Karakorum ranges to reach Kashmir becomes apparent. This has been found abundantly in Kurrum valley of Afghanistan, terminal morain sheltered areas or broken rocky places of different glaciers in the valleys of Karakorum range, like Charesa, Hispar, Barpu glaciers, etc, eastern side of Barum south glacier at Chitral and Rana valley in south-west of Astor-Gilgit Agency of Kashmir and upper Satpura range of Baltistan. The distribution further extends northwords through the Tien Sang range and reaches West Tibet near the foot of Baltora glacier. *H. astragaloides* Benth. ex Bak. has its restricted distribution in grassy slopes of Kistwar and Ajoy valley of Kashmir, extending southwards up to Punjab as it occurs in Chanab valley of upper Chenab and in Lahul at elevations between 3500–4500 m. *H. cachemirianum*

Benth. ex Bak. is endemic in Kashmir and distributed scatteredly in earthy north facing slopes of Kolohoi valley and Liddar valley reaching high up to 3800 m.

Among acaulescent species, *H. minjanense* Rech. f. is seen in comparatively dry conditions of West and Middle Asian mountains along the upper region (Pamir Alai, Tien San ranges) of the Himalaya from Afghanistan reaching only at Gilgit-Dirah pass of Kashmir. Another such species, *H. kumaonense* Benth. ex Bak., however, extending eastwards along the grasslands slopes through Tibet from Kumaon Himalaya reaches Central Nepal, the western limit of the Eastern Himalaya. *H. sikkimense* Benth. ex Bak., preferring rather moist habitat of Sikkim, extends towards West China along the Eastern Himalaya through Bhutan in the east reaching Szechwan and Yunnan. It often extends westwards to Nepal, occasionally reaching Kashmir in the Western Himalaya through Tibet. One of its variety '*megalanthum* Ohashi et Tateishi', discovered recently has a range of distribution from South-East Tibet to North-West China (Kansu) and Western China (Szechwan, Yunnan). *H. campylocarpon* Ohashi, *H. manalense* (Kitamura) Ohashi and var. *nepalense* (Ohashi) Ohashi are endemic to Central Nepal and believed to be of recent origin (Ohashi & Tateishi 1975). However, in the retreating Himalayan habitat neither species can be considered endemic with certainty.

It thus appears from a general study of the phytogeography of *Hedysarum* L. that the Indian distribution of its various species is related to the members of Western, Middle and North Asian mountains in its western sectors and on the eastern side with members of Western and North-Western China.

References

Ali, S.I. 1977. Flora of West Pakistan No. 100. Karachi. Chrtková-Žertová, A. 1968. *In* Flora Europea 2. Cambridge. Fedtschenko, B.A. 1902. *Hedysarum*. *In* Act. Hort. Petrop. **19**: 183-375. Ohashi, H. & Y. Tateishi 1975. The genus *Hedysarum* (Leguminosae) in the Himalaya. *In* Flora of Eastern Himalaya (3rd report), Univ. Mus. Univ. Tokyo Bull. No. 8. 363-392. Rau, M.A. 1975. High altitude flowering plants of West Himalaya. Howrah-3. Singh, G. & P. Kachroo 1976. Forest flora of Srinagar. Dehra Dun. Tiwari, S.D.N. 1979. The phytogeography of legumes of Madhya Pradesh.

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ヒマラヤには10種1亜種2変種のイワオウギ属植物(マメ科)が知られており，インドにはそのうち7種1亜種が，西ヒマラヤと東ヒマラヤとに分布する。西ヒマラヤには西，中央あるいは北アジアの山地から，東ヒマラヤには西あるいは北西中国から，ともに比較的近年に分布してきたものと思われる。

□菱山忠三郎・久世：**イラスト野草図誌** 233pp. 1986. 有峰書店新社，東京. ¥2500. 東京都八王子市・多摩地方の野草186種を図説したもの。菱山氏はこの方面の植物を長年調査研究している人で，今までにも「多摩の草木記」などの著書がある。一種ごとに図と解説があり，久世夫人が図を描いている。図はスケッチ風の線描で，実によく特徴を捉えていてわかりやすい。解説は植物の説明のほかに，名前の起こりや伝説・民俗・文学・利用など豊富なおもしろい内容である。 (伊藤 洋)

□井波一雄：**広島県植物図選 III** 100 pls. 1985. 博新館，広島. ¥5,500. 100種の図を画いたものである。1981年に第一巻100種，1982年に第二巻100種が出版され，これで300種の図がのせられたことになる。今回のせられた100種のうちの18種は広島県新産であるというなど，克明に調査された上で書かれたものであることがわかる。イワヤクシソウ，サンベサワアザミ，ダイセンミツバツツジなど今まで図を見る機会のなかったものがのせられているのは，見ていても興味をひく。特にハイルリソウは愛知県にしか知られていなかったものなので，貴重な図である。ただ，折角，主に生品から書かれたものなのだから，もっと詳しい記載をつけておいてくれると，学術的価値が一層高まったものと思う。花の色や生育環境など，図では示せないことも書いておいてもらいたかった。例えばウンゼンツツジは花が白色と書かれているが，おそらく純白でなく，内面に赤色の斑点があったのではないかと思う。これは同じウンゼンツツジでも伊豆や紀州のものと違って，四国，中国地方の一型と考えられる。純白のシロウンゼンとは異なるのである。また，採集地が番号で書かれているが，非常にわかりにくい。地形図索引番号は地図がついているのでわかるが，位置のU.D.R.L.や金井索引番号は解説をつけるべきであろう。文中にはでてこないが，植物の採集，資金の調達など，本書の出版は発行者の丹藤順生氏の並々ならぬ努力によるところが大きいようである。多くの方々の協力によって続けられているこの貴重な本の出版も次第にむずかしくなっているようであるが，目標の五巻まで続くよう願わずにはいられない。博新館の住所は次の通り。
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